PATENT SPECIFICATION

375,010

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PROVISIONAL SPECIFICATION.

Improvements relating to Sound Reproducing Instruments.

I, HARRY CLAUDE WILLSON, a British Subject, of "Walton", Beckminster Road, Wolverhampton, do hereby declare the nature of this invention to be as follows:—

This invention relates to sound reproducing instruments, and particularly to telephone instruments of the electro-dynamic or moving coil type.

In this form of loud-speaking telephone instrument the cost of production may be reduced by the use of a small gap, but difficulties then arise in centering the moving coil with respect to the magnet poles, and secondly in all forms of sound reproducers of this type defects are likely to occur in the joint between the cone diaphragm and the tubular support for the moving coil; weakness at that joint gives rise to concertina action or local buckling, and the moving coil cannot then efficiently transmit its movement to the diaphragm. The objects of the present invention are mainly to remove these drawbacks.

According to the invention the magnet producing the permanent field, which may either be a wound magnet or a permanent magnet, is spigotted into the frame of the instrument, and in order properly to centre the moving coil before the magnet is placed in position the bored seating to receive it has fitted into it an assembling jig, a projecting member of which fits the inner surface of the tubular former or support for the moving coil. The moving coil with the cone attached is placed upon this projection thereby being properly centered, and with the jig in position is mounted in the instrument. It is preferred to effect this operation by means of hollow rivets, holes in the supporting framework in appropriate positions serving as a locating template for the rivet holes. The rivets are placed in position and secured, and the moving system may also be located at the neck of the diaphragm. For this purpose, projecting outwards from the neck is a spider consisting of radial arms and a concentric portion having clearance holes at the ends of the arms so that bolts can be placed through these holes and through holes in the face of the frame casting. In order to prevent twisting during tightening up these bolts, assuming that there are four arms to the spider, two curved strips are provided each forming a quadrant of a ring. Holes at the ends of these strips fit over two consecutive bolts so that the strips serve as elongated washers which, owing to their shape, cannot turn as the bolts are tightened up. This finishes the securing of the moving system in position and the centering jig can now be removed and the spigot on the front of the magnets fitted in the bored seating and secured by bolts. The magnets themselves may be permanent magnets with arms of cobalt steel and pole pieces formed as insertions into the steel casting.

The edge part of the diaphragm, which is clamped by the hollow rivets, may be connected to the conical part of the diaphragm by a flexible surround. The method of connecting the conical diaphragm to the coil former before the whole system is mounted in the instrument framework may be as follows:—An inner conical driving member fitting within the neck of the diaphragm is placed upon the nose of a conical jig. The cone diaphragm itself is cemented to the outside of this driving member, the edge of the latter being serrated. The conical jig is recessed towards its nose or apex so that the inner driving member can seat in the recessed portion. The latter, however, has upstanding protuberances which engage in the spaces between the teeth of the same thickness in the edge of the driving member acting somewhat as a dog clutch, the purpose of which is to prevent relative rotation between the diaphragm with its driving member and the conical jig during assembly. At this stage an outer conical driving member with a flanged lip is dropped over the diaphragm on the jig, the spider with the radial arms and concentric portion already referred to is dropped over into contact with the inner edge of the outer driving member, and then the coil former which is formed with an internal screw-thread is screwed on to the cylindrical end of the inner driving member, which is suitably screw-

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threaded for this purpose. The threads of the two engaging members need not fit accurately as a cement or adhesive is employed finally to secure them together, in order to prevent relative rotation after assembly. Although the actual driving effort from the coil to the diaphragm is transmitted through the screw-threads, the driving coil is wound on the surface or in a recess in the former tube in the ordinary way. The whole instrument may be finished by fitting on a sheet metal pressed dust over on the back to enclose the magnets.

The diaphragm may be made of any suitable material in any desired way. It may either consist of paper or of a seamless material such as buckram suitably impregnated and may be conical or any other suitable shape.

Dated this 16th day of April, 1931.

For the Applicant:
GILL, JENNINGS, & EVERY-CLAYTON,
Chartered Patent Agents,
51/52, Chancery Lane, London, W.C. 2.

COMPLETE SPECIFICATION.

Improvements relating to Sound Reproducing Instruments.

I, HARRY CLAUDE WILLSON, a British Subject, of "Walton", Beckminster Road, Wolverhampton, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to sound reproducing instruments, and particularly to telephone instruments of the electro-dynamic or moving coil type.

In instruments of this kind the cost of production may be reduced by employing a small air gap. Difficulties then arise in centering the moving coil with respect to the magnet poles and the objects of the present invention are mainly to reduce these difficulties to a minimum.

According to the present invention, the component parts of the sound reproducer, including the moving coils and its supports, are assembled by the aid of a jig temporarily mounted on a supporting frame for the component parts, and after removal of the jig a field magnet is mounted on the supporting frame in a position co-axial with that previously occupied by the jig. Both the jig and the magnet may be mounted on the supporting frame by being spigotted into the frame, but in the case of a magnet energised by a coil it may be more convenient to locate these parts on the frame, by accurately fitting dowels or other suitable means. The jig employed is formed with a portion designed to conform closely with the support upon which the moving coil is wound. The moving coil is placed upon the projecting portion of the jig, and the centering member, which may conveniently be in the form of a flexible spider, is loosely mounted within the supporting frame. The jig with the coil and its tubular support is loosely mounted on the supporting frame, and when the centering spider is placed so that the tubular support for the coil is registered with the spider by means of a plug fitting accurately in the jig, the loosely mounted parts are tightened, and as already indicated, when the jig is removed the field magnet is fixed on the supporting frame in a position co-axial with that previously occupied by the jig. The sound-radiating conical diaphragm, which may be moulded from buckram or the like and suitably doped, is secured by a suitable adhesive or in any other manner to the tubular support for the coil and to the centering device before the assembly jig is removed from the framework. A convenient method of mounting the diaphragm in the instrument is by the use of hollow rivets, holes in the rim of the supporting framework serving as a locating template for the rivet holes, and the rivets are placed in position and secured.

In order that the invention may be clearly understood, an instrument in accordance therewith will now be more fully described, together with the method of assembly, with reference to the accompanying drawings, wherein—

Figure 1 is a central section of the completely assembled instrument;

Figure 2 is an elevation seen from the rear of one half of the instrument, the dust cover being removed and the magnet being removed from the upper half;

Figure 3 is a side elevation showing certain parts of the instrument before assembly, and also illustrating the jig employed which is shown partly in section.

Figure 4 is a fragmentary view to an enlarged scale of the details of the movement.

Referring to Figures 1 and 2, the

pressed steel casing of the instrument is shown at a; the permanent magnet b is secured to the back face of it and is enclosed in a dust cover c. The moving coil is carried on its tubular support d attached to the conical diaphragm e. They are centered by the flexible spider f carried on pillars g from a flat metal ring k, best seen in Figure 3, and the diaphragm is connected at its rim by hollow rivets h to the framework.

In assembling the instrument, first of all the unit comprising the spider f, the pillars g and the flat metal ring k, is laid inside the dished part of the casing a and is loosely secured by screws l which pass through clearing holes in the base of the casing a and are not fully tightened up at this stage. Next the moving coil d^1 on its tubular support or former d is placed upon the projecting part m^1 of the jig m. The jig m is then fitted in the back of the casing a, a shoulder m^3 spigotting into the aperture a^1 in the back of the casing a locating it with reference thereto and the jig is held loosely in position by screws passing through the holes m^3 which screws pass into tapped holes in the flat ring k. The whole accuracy of centering depends upon the fit of the jig in the central aperture a^1, and of the magnet in the same aperture. The jig plug n is then inserted through the spider f into a central bore in the jig m and the head n^1 fits accurately within the tubular support d of the coil. The result of this insertion of the plug is to cause the spider to move slightly if necessary, to be co-axial with the speech coil d^1. At this stage the screws l are tightened up fixing the ring k and the spider f in position. Next the screws or bolts passing through the holes m^3 in the jig m are tightened up to secure the jig m firmly to the framework a. It is clear that the speech coil d^1 and the spider f occupy their correct positions with respect to the aperture a^1 in the back of the framework.

The speech coil d^1 is connected by two flexible leads to terminals on the outside of the framework a. In order to avoid confusion, these details are not shown in Figures 1, 2 or 3 of the drawings but in Figure 4 one of the flexible leads r is clearly shown attached at one end to a terminal s on the casing a and at the other end to an eyelet t secured to the spider f. The end u of the speech coil is led along the top of the tubular support d under a strip of paper v in the form of a band encircling the tubular support and is soldered to the eyelet t at a later stage in the assembly operation. The other end of the speech coil is similarly attached to a flexible lead which in its turn is attached to a second terminal on the framework a.

A certain amount of adhesive or cement is placed on the outer face w of the inner ring x of the spider f and also for a small depth on the inside of the speech coil tubular support d the plug n having previously been removed. Then the conical diaphragm e which is of moulded buckram or paper suitably doped, is together with its cardboard ring e^1 inserted into the mouth of the tubular support d for the speech coil and is pressed lightly into position. The cylindrical projection e^2 on the cone fits the inside of the tubular support d and the hole in the spider "f". The circumference of the diaphragm e is made of slightly smaller diameter than the turned over flange a^2 of the rim of the casing a and the metal clamping ring o is placed in position, care being taken that twelve holes punched in the ring o register with a similar number in the rim of the framework a and with holes punched through the rim of the diaphragm e so that rivets h may be inserted in alternate holes. By means of these rivets the rim of the conical diaphragm is held securely in position.

The four bolts through the holes m^3 in the jig are next removed, the jig m taken away and at this stage the wires from the speech coil are soldered to the eyelets t on the spider f. The field magnet b is then fitted with its shoulder b^1, which corresponds to the shoulder m^2 on the jig m and is shown clearly in Figure 4, entering the aperture a^1 and is secured in position by the four bolts p. Finally, the dust cover c is placed in position and felt pads fitted to the rim as shown at q.

It will be noticed that due to this method of assembly the position of the speech coil d^1 is correct both as regards centering and as regards its axial position with respect to the magnet.

The invention is not limited to the particular construction set forth, for example, instead of the permanent magnet b shown, a magnet provided with an energising winding may be employed and instead of employing the central aperture a^1 with the shoulder m^3 on the jig and the shoulder b^1 on the magnet b, other means of locating may be employed; such as accurately fitting dowels and the like. It will be noted that the diaphragm e is illustrated as connected to the rim portion by a corrugated edge e^3 which forms a flexible surround.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A method of assembling component

parts of a sound reproducer of the electrodynamic type in which the several component parts including the moving coil and its centering member are assembled by the aid of a jig, temporarily mounted on a supporting frame for the parts and after removal of the jig, a field magnet is mounted on the supporting frame in a position co-axial with that previously occupied by the jig.

2. A method of assembling component parts of a sound reproducer according to claim 1, in which the jig employed is formed with a portion designed closely to conform with a tubular support upon which the moving coil is wound and is also formed to register with a co-operating part of the supporting frame for the component parts of the sound reproducer.

3. A method of assembling component parts of a sound reproducer of the electrodynamic type in which a centering member for the moving coil wound on a tubular support is firstly loosely mounted within a supporting frame and an assembly jig carrying the tubular support for the coil is then loosely mounted on the said supporting frame while a detachable part of the assembly jig serves to determine the relative positions of the coil and its centering member with respect to the assembly jig, the loosely mounted parts being tightened when the desired relative positions are obtained and after removal of the jig, a field magnet is mounted on the supporting frame in a position co-axial with that previously occupied by the jig.

4. A method of assembling component parts of a moving coil sound reproducer according to claim 3, in which a sound-radiating diaphragm is secured to the tubular support of the coil and its centering member before the assembly jig is removed from the supporting framework.

5. A sound reproducer of the electrodynamic type having component parts including a field magnet, a driving coil, a member serving for centering it and a sound-radiating diaphragm associated with the coil, together with a supporting frame common to the component parts which have been assembled on a jig temporarily mounted on said supporting frame and which serves to determine the final positions of said component parts.

6. A sound reproducer of the electrodynamic type, having its component parts assembled substantially as described with reference to the accompanying drawings.

Dated this 16th day of January, 1932.

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Fig. 1.

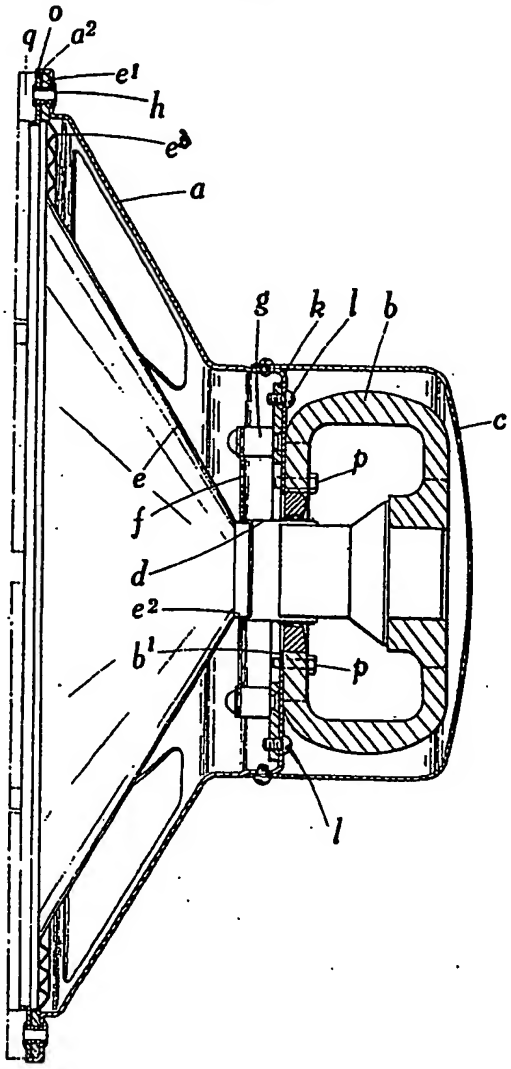
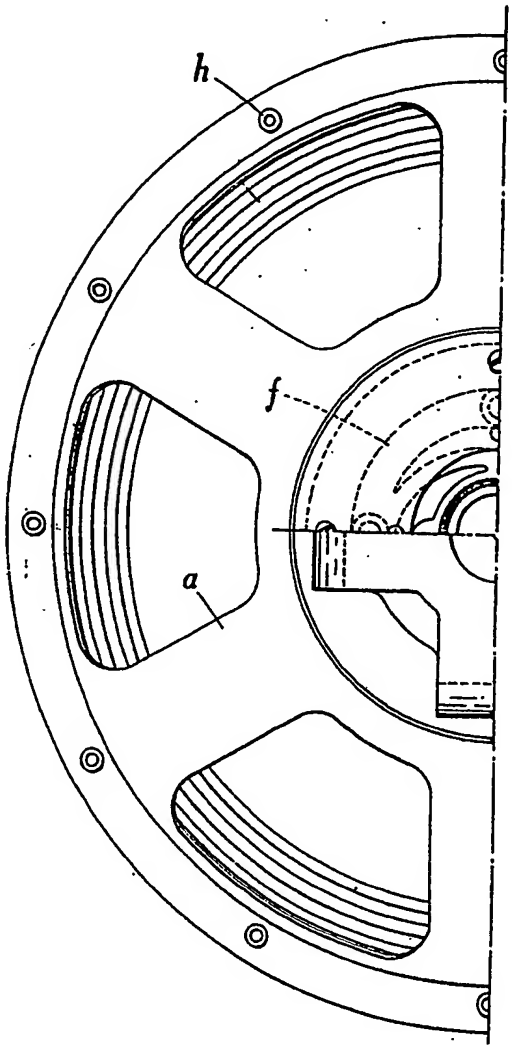


Fig. 2.



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g. 2.

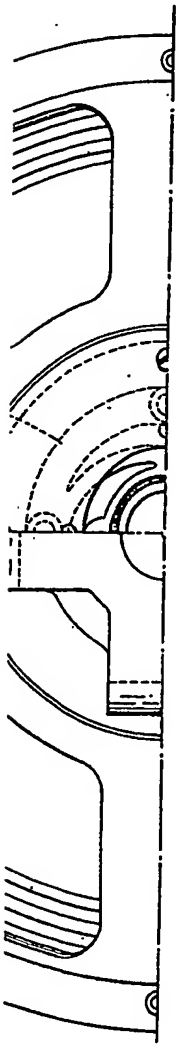

Fig. 3.

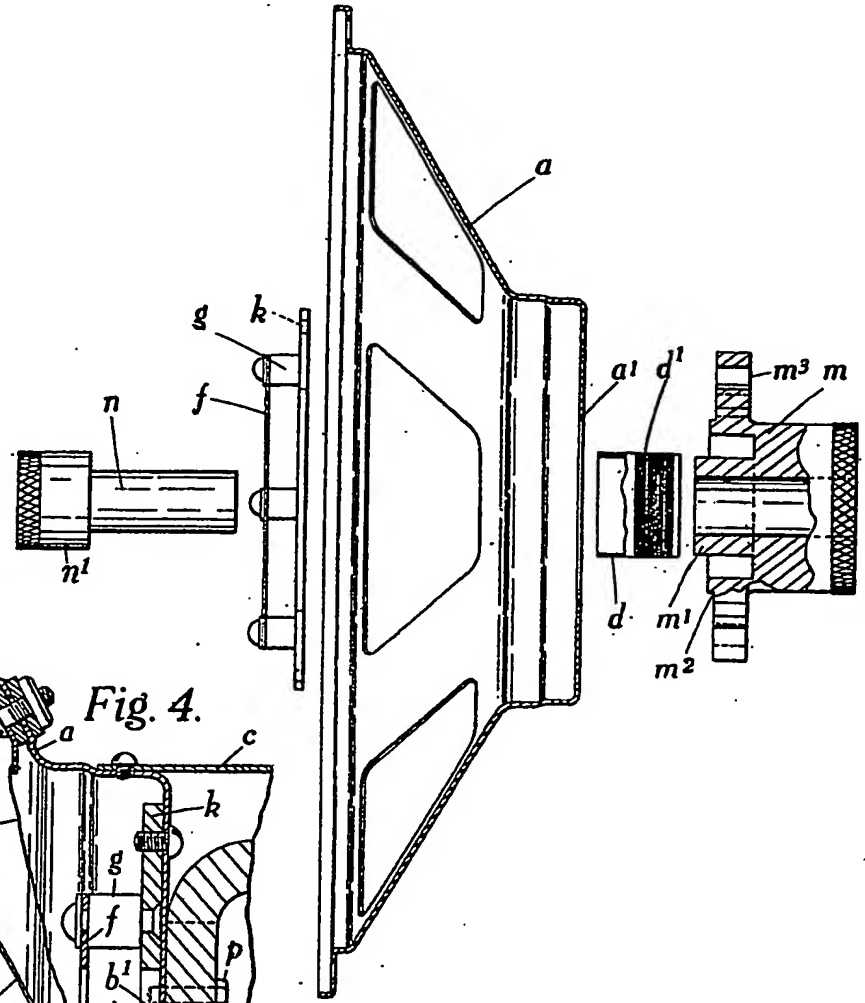

Fig. 4.

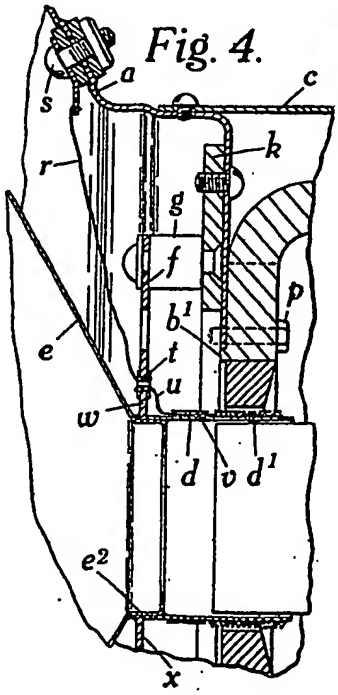

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Fig. 3.

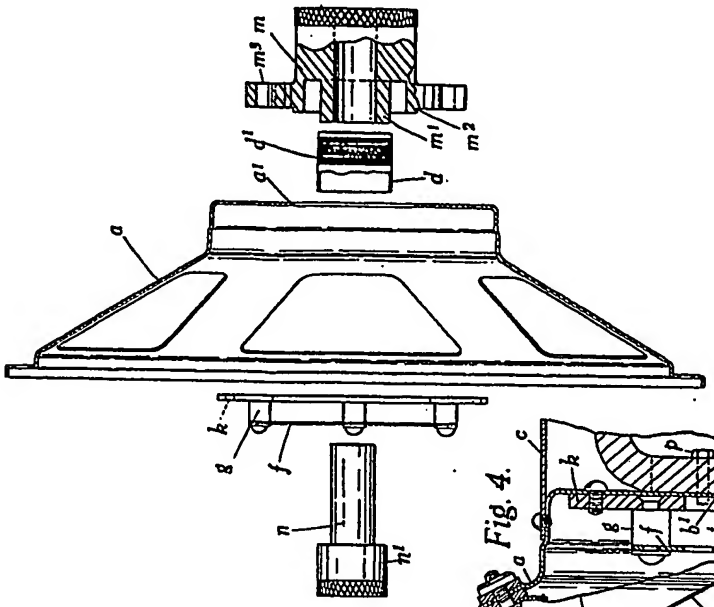


Fig. 4.

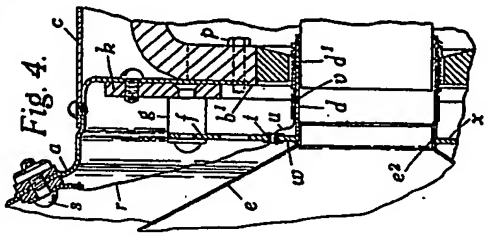


Fig. 2.

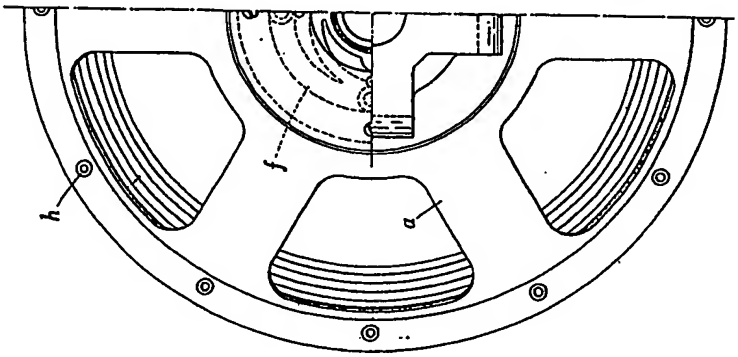
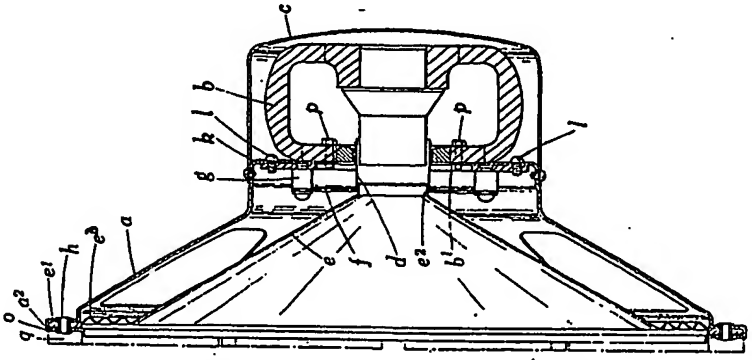


Fig. 1.



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